ENTOMOLOGY.[1]

North American Proctotrypidæ.—Mr. Wm. H. Ashmead furnishes in his Monograph of North American Proctotrypidæ,[2] one of the most important of recent descriptive works on American insects. In preparing the 457 pages of his text the author has had ample opportunities to work up our rich Proctotrypid fauna, studying in addition to the various American collections those of the Royal Museum of Berlin. Mr. Ashmead believes that the Proctotrypidæ are more closely allied to the Chrysididæ and Cynipidæ than to the Chalcididæ, next to which they are so commonly placed. He would separate the Mymarinæ as a distinct family allied to the Chalcids.

The lives of adult Proctotrypids are of short duration, not longer than four or five days in confinement, though probably longer under natural conditions. They occur in a great variety of situations, the favorite resorts of some being moist places where vegetation is luxuriant and insect larvæ abundant; others are found along the borders of woods or in the open fields; still others frequent fungi, and some occur in ant's nest. Comparatively few are found on flowers.

"There is scarcely any doubt but that many of the wingless forms to be found in various genera of this family are only dimorphic forms of winged species, although comparatively little is postively known on the subject." The eggs of these insects are "ovate or oblong in shape, with a more or less distinct peduncle at one end, and agree well in general with many in the family Ichneumonidæ, although those in the subfamily Platygasterinæ, on account of the longer peduncle, more closely resemble those in the family Cynipidæ." The larvæ are internal feeders, and in pupating plan for a protection of some kind.

"The Proctotrypidæ are apparent widely distributed over the whole world, although outside of Europe little is known of the exotic forms, and it is not possible therefore to generalize upon the genera and their distribution. From an examination of various exotic collections of Hymenoptera, it is safe to predict the species will be found to be numerous and widely distributed, but far less numerous than the Chalcididæ; judging from my own collecting I should say less than one-fiftieth in number. Only a small percentage of the species is yet described." The affinity of North American forms with those of

[1]Edited by Prof. C. M. Weed, Durham, N. H.

[2]Bull. 45, U. S. Natl. Museum, Washington, 1893.

Europe is shown by the way they fit into established European genera. South American species have required the erection of many new genera.

A large number of new species are described in the present monograph, which concludes with a full Bibliography and eighteen original plates illustrating structural details of members of the various genera.

Peculiar Oviposition of an Aphid.—During the autumn of 1890 I found a species of *Phyllaphis* on beech in central Ohio, the oviparous form of which agrees with Buckton's short description and figure of *P. fagi*. I presume that it is that species, but do not think the present evidence justifies a definite reference to that effect. The colonies were found on the underside of the leaves, with more or less flocculent matter about them. The sexed forms developed during October, and the oviparous females wandered over the bark of the twigs, limbs, and trunk in search of crevices in which to deposit their eggs. When a

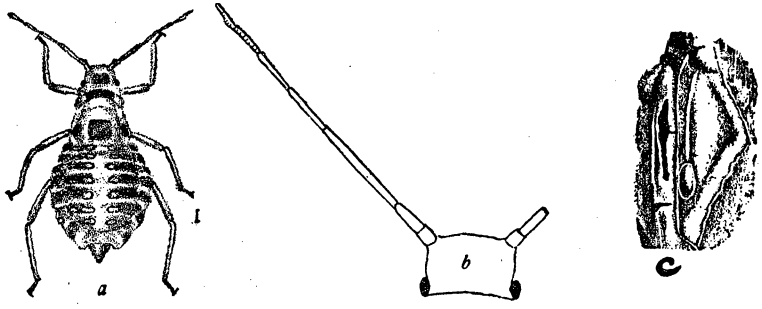


Fig. 1.—***Phyllaphis*** of beech: *a*, oviparous female, magnified; *b*, head and antenna of same, greatly magnified; *c*, egg on bark, magnified.

suitable place is found the egg is laid, and then driven into position by the following method: The insect so places itself that its hind legs easily touch the egg, then standing on its four front ones it brings the two hind ones down upon the egg in rapid succession, striking with considerable force. This serves the double purpose of pushing the egg in place, and of drawing out a viscid secretion, with which it is covered into a thread-like, silvery film, that so resembles the surrounding bark that it is difficult to detect it. I watched an oviparous louse go through this process for about a minute and a half.—*C. M. Weed in Trans. Am. Ent. Society, November*, 1893.

Pupal Development and Color in Imago.—Discussing the recent experiments of Merrifield in which lepidopterous pupæ were submitted to various temperatures and the results on the imagoes noted, Mr. J. W. Tutt briefly recapitulates[3] the well-known facts of histolysis and continues thus: "If we apply the simplest elementary laws relating to vital force to the pupa, we shall find that the following facts hold good:—(1). The pupa when first formed has a certain amount of inherent vital force by means of which both the processes of histolysis and rehabilitation are carried on in it. (2). That pupa which has the nearest approach to the normal amount of vital force will undergo the most perfect histolysis and rehabilitation, and will produce an imago most nearly conforming to what is known as the normal type, that is the type produced under the most healthy and satisfactory conditions. Conversely that pupa whose amount of vital force is farthest removed from the normal (whether in excess or in defect) is one in which histolysis and rehabilitation will be least perfect, and the imago produced will be the farthest removed from the normal type. (3). That individual which has been best fed and which had enjoyed the most perfect health in the larval stage, will enter pupal life under the most satisfactory conditions and will (the pupal conditions being equally satisfactory) emerge therefrom as the best specialized product, whilst the converse to this must also be true.

"The second point also deals with an elementary principle. The vital force in the pupa is converted into energy; the energy at the disposal of the pupa is most probably directed first to the building up of the vital reproductive organs, and afterward to the secondary organs or tissues or such as are not necessary to life. Therefore an excess of energy in a pupa will be expended as a rule on secondary structures rather than on vital ones, and we find that a weak or diseased pupa fails first in regard to non-vital tissues, such as pigment, scales, wing-membrane, etc.

"The females of insects, as compared with the males require an excess of energy for those structures necessary to the reproduction of the species; they, therefore, have a smaller surplus to devote to the formation of the non-vital tissues, and as we well know frequently fail very markedly in their development of these.

"We are now in a position to understand that as a general rule pigment, scales, etc., are produced in proportion to the amount of material and energy available for the purpose.

[3]The Entomologist's Record, IV, 312.

"These and other general principles have to be considered when we attempt to discuss the results which Mr. Merrifield produces by his temperature experiments.

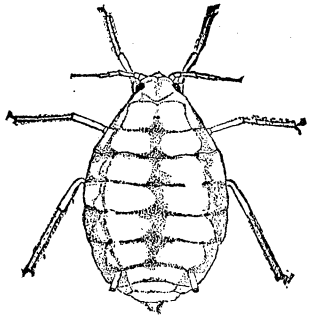
* * * "If now we apply these principles what do we find? Insects which are allowed to pass through their changes at the normal temperature produce the form which is normal for the district; that is they undergo the normal processes of histolysis and of rehabilitation, and in a state of health have at their disposal the energy requisite to give them their ordinary wing expanse, scaling and color. Now what does Mr. Merrifield do in his experiments? He subjects the pupa to a low temperature. This of necessity lowers the vitality of the pupa and so lessens the available energy. The insect therefore does not develop under normal conditions, and an abnormality is the result. The insect must use what energy it has to build up its vital organs, and fails in building up perfectly its secondary tissues—color, scales, wing membrane, and fails to in direct proportion to the degree in which the vitality is lessened. Below a certain temperature during the period of active development the vital force ceases to act at all, and the result is death. Heat, greater than that to which the insect is normally subjected, instead of lowering the vitality to the lowest ebb at which life can be sustained, affects the histolysis and rehabilitation in a directly opposite manner. Under its influence the vital processes are carried on at express speed. Energy is expended at the fastest rate possible, and the tissues are formed without having sufficient time to mature as they would under normal conditions, the surplus material is rapidly utilized, with the result that as marked an abnormality is produced under the one condition as under the other, although in an opposite direction."

Studying Insect Histories.—That the pursuits of the entomologists are not always so delightful as the chasing of June butterflies is shown by the following extract from a paper recently read by Mr. L. O. Howard before the Association of Economic Entomologists: To gain the clearest and most accurate idea of a life history, the insect must be studied under perfectly natural conditions, and not under conditions which more or less imperfectly simulate the natural ones. There is no easy road to the most perfect knowledge of habits. It involves tramping through mud and bramble patches; it involves the constant risk of sunstroke, and in our southern country the constant presence of Leptus and Ixodes (itch-mites and ticks); it involves constant watching and watching and watching, astride the small limb af a fruit tree,

perhaps, on your back under bushes, on your knees in the wheat-field, on your stomach in the pasture, with your face down close to a cow dropping, and with the summer sun beating down upon your unprotected head, watching and watching until the eyes grow dim; but in this way only are the unsolved problems in the life histories of injurious insects most satisfactorily worked out.

Biology of the Apple Aphis.—The common Aphis of the apple (*A. mali*) has for many years puzzled entomologists by its summer history. During June, usually, winged viviparous females leave the apple and disappear. In September other similar forms return to apple and give birth to the oviparous females which deposit the eggs on the twigs. In a paper on the insect foes of American cereals read at the recent meeting of the Association of Economic Entomologists, Mr. F. M. Webster of the Ohio Experiment Station gave a clue to the summer history in the following paragraph:

"It would appear almost visionary to advocate spraying apple orchards in midwinter to protect the wheat crop, but nevertheless one of the most serious enemies of young fall wheat passes its egg stage on the twigs of apple during the winter season. I refer to the Apple Leaf-louse (*Aphis mali* Fabr.), Soon after the young wheat plants appear in the fall, the winged viviparous females of this species flock to the fields, and on these give birth to their young, which at once



Apple Aphis; wingless viviparous female. Magnified.

make their way to the roots, where they continue reproduction, sapping the life from the young plants. On very fertile soils this extraction of the sap from the roots has no very serious effect, but where the soil is not rich, especially if the weather is dry, this constant drain of vitality soon begins to tell on the plants. Though they are seldom killed out right these infested plants cease to grow, and later take on a sickly

look, and not until the Aphis abandons them in the autumn to return to the apple, do they show any amount of vigor."

This leaves the summer period still unaccounted for, but in the discussion which followed Mr. Webster's paper, Dr. C. V. Riley stated that he had "for a number of years known that this species had a summer existence on various grasses."[4]

Nematodes in Cecidomyia.—At a recent meeting of the *Societè Entomologique de France,* M. A. Girard called attention to the observation of Kieffer[5] as to the existence of Nematode parasites in a female cecidomyiid (*Asynapta citrina* Kieff.). A fly of this species stupified by nitro-benzine emitted from the oviduct a compact mass of Anguillulas which placed in water moved about rapidly. Kieffer thought that the alimentary canal also contained these Nematodes, but Girard believes it to be a case where only the abdomen, especially the region of the ovaries is inhabited by the parasite. He reports a similar observation of his own, in which an undetermined cecidomyiid was the host. The body cavity was nearly filled with a Nematode of the genus Asconema and its embryos. The ovaries of the fly were atrophied by parasitic castration. The eggs of the Nematode developed in the body of the fly, and the latter laid the little Anguillulas in humid situations where they could develop.

Flights of Dragon-Flies.—In. Mr. W. H. Hudson's recently published *Naturalist in La Plata* there is an extremely interesting chapter on Dragon-fly Storms. In the Pampas and Patagonia, the larger species of these insects—especially *Æschna bonariensis* Raml., a pale blue form—frequently occur in enormous flocks which appear shortly in advance of a sudden and violent wind—called the *pampero.* "Inasmuch as these insects are not seen in the country at other times, and frequently appear in seasons of prolonged drouth, when all the marshes and water courses for many hundreds of miles are dry, they must of course traverse immense distances, flying before the wind at a speed of seventy or eighty miles an hour. * * * As a rule they make their appearance from five to fifteen minutes before the wind strikes; and when they are in great numbers, the air to a height of ten or twelve feet above the surface of the ground, is all at once seen to be full of them, rushing past with extraordinary velocity in a northeasterly direction. * * * * All journey in a northeasterly direction; and of the countless millions

[4]Insect Life, VI, 152.

[5]Berlin Ent. Zeitsch., XXXVI, 1891, p. 266.

flying like thistle down before the great pampero wind, not one solitary traveller ever returns."

These flights occur during the summer and autumn. Mr. Hudson thinks the cause "is probably dynamical, affecting the insects with a sudden panic, and compelling them to rush away before the approaching tempest. The mystery is that they should fly from the wind before it reaches them, and yet travel in the same direction with it.

* * * On arriving at a wood or large plantation they swarm into it, as if seeking shelter from some swift pursuing enemy, and on such occasions they sometimes remain clinging to the trees while the wind spends its force."

Mr. Hudson calls attention to Weissenborn's observation of a dragon-fly migration in Germany in 1839,[6] and his mention of similar flights in 1816. These occurred in May and the insects flew south.

An autumn flight of dragon-flies among the Alps has been described by W. Warde Fowler[7] whose attention was called to the flight by a waiter in an Alpine hotel. The latter had "observed a constant stream of dragon-flies making their way up the valley; and during my walks that day I was able fully to verify his statement. All the way from Haspenthal to Andermatl these creatures were to be seen coming up *against the wind*, which was now blowing from the west. There was no mistake about it; countless numbers were steadily passing up the valley, but whither they were going it was hopeless to ascertain; they did not seem to turn up the St. Gotthard Road, for I remarked them the whole way up the valley to the foot of the Furka Pass Westwards."

A Carnivorous Tipulid.—Professor L. C. Miall describes[8] the early stages of a crane-fly of the genus Dicranota with aberrant habits for Tipulidæ, the larvæ of which are mostly vegetable-feeders. This larva lives in the bottom of brooks or other water streams and feeds upon the red worms of the genus Tubifex. The head of the larva is small, the alimentary canal straight and the body is provided with spiracles and tracheal gills, so that the animal can breathe in or out of water. Pupation take place in moist soil.

Notes.—Mr. Albert P. Morse begins in the current issue of *Psyche* an important paper on the Wing-lengths of New England Acridiidæ,

[6] Mag. Nat. Hist. n. s,, v. III.

[7] A Year with the Birds, 202.

[8] Trans. Ent. Soc., London, 1893, 235.

and in the same issue Mr. S. H. Scudder publishes some interesting biological notes on American Gryllidæ. With this issue, *Psyche* begins its seventh volume.

Mr. G. C. Davis has prepared an interesting and valuable illustrated paper on insects injurious to celery. It is issued as Bulletin 102 of the Michigan Experiment Station.

Professor Herbert Osborn, Ames, Iowa, has bound together two of his recent papers on injurious Iowa insects which contain much valuable information. He offers a limited number of copies for sale at 30 cents each.

An excellent biographical notice of Dr. H. A. Hagen appears in *Entomological News* for December.

Professor M. H. Beckwith reports[9] that in Delaware during the past season crops of all kinds have been unusually exempt from the attacks of insects. In his summary of the year's work he discusses a number of injurious insects and experiments with remedies. The arsenites were found effective for the plum curculio, and the pyrethro-kerosene emulsion proved an excellent destroyer of aphides.

The last issue of *Insect Life* contains a full report of the Madison meeting of the Association of Economic Entomologists.

[9]Fourth Rept. Del. Ag. Expt. Station, 89–103.